

SEQUENCE LISTING

<110> Lorz, et al.

<120> NUCLEIC ACID MOLECULES WHICH CODE FOR ENZYMES DERIVED FROM WHEAT AND WHICH ARE INVOLVED IN THE SYNTHESIS OF STARCH

<130> 514413-3849

<140> 09/674,817

<141> 2000-11-06

<150> PCT/EP99/03141

<151> 1999-05-07

<150> 19820608.9

<151> 1998-05-08

<160> 10

<170> PatentIn version 3.0

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<223> exon 1

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<222> (297)..(396)

<223> intron 1

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<222> (397)..(1617)

<223> exon 2

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Ala Gly Lys Gly Val Gly Glu Val Cys Ala Ala Val Val Glu Ala Ala	
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acg aag gta gag gac gag ggg gag gag gac gag ccg gtg gcg gag gac	143
Thr Lys Val Glu Asp Glu Gly Glu Glu Asp Glu Pro Val Ala Glu Asp	
35 40 45	
agg tac gcg ctc ggc ggc gcg tgc agg gtg ctc gcc gga atg ccc gcg	191
Arg Tyr Ala Leu Gly Gly Ala Cys Arg Val Leu Ala Gly Met Pro Ala	
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ccg ctg ggc gcc acc gcg ctc gcc ggc ggg gtc aat ttc gcc gtc tat	239
Pro Leu Gly Ala Thr Ala Leu Ala Gly Gly Val Asn Phe Ala Val Tyr	
65 70 75	
tcc ggc gga gcc acc gcc gcg gcg ctc tgc ctc ttc acg cca gaa gat	287
Ser Gly Gly Ala Thr Ala Ala Ala Leu Cys Leu Phe Thr Pro Glu Asp	
80 85 90 95	
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Leu Lys Ala	
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gat agg gtg acc gag gag gtt ccc ctt gac ccc ctg atg aat cgg acc	444
Asp Arg Val Thr Glu Glu Val Pro Leu Asp Pro Leu Met Asn Arg Thr	
100 105 110	
ggg aac gtg tgg cat gtc ttc atc gaa ggc gag ctg cac aac atg ctt	492
Gly Asn Val Trp His Val Phe Ile Glu Gly Glu Leu His Asn Met Leu	
115 120 125 130	
tac ggg tac agg ttc gac ggc acc ttt gct cct cac tgc ggg cac tac	540
Tyr Gly Tyr Arg Phe Asp Gly Thr Phe Ala Pro His Cys Gly His Tyr	
135 140 145	
ctt gat gtt tcc aat gtc gtg gtg gat cct tat gct aag gca gtg ata	588
Leu Asp Val Ser Asn Val Val Val Asp Pro Tyr Ala Lys Ala Val Ile	
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agc cga ggg gag tat ggt gtt cca gcg cgt ggt aac aat tgc tgg cct	636
Ser Arg Gly Glu Tyr Gly Val Pro Ala Arg Gly Asn Asn Cys Trp Pro	
165 170 175	
cag atg gct ggc atg atc cct ctt cca tat agc acg ttt gat tgg gaa	684
Gln Met Ala Gly Met Ile Pro Leu Pro Tyr Ser Thr Phe Asp Trp Glu	
180 185 190	
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Gly Asp Leu Pro Leu Arg Tyr Pro Gln Lys Asp Leu Val Ile Tyr Glu	

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atg cac ttg cgt gga ttc acg aag cat gat tca agc aat gta gaa cat				780
Met His Leu Arg Gly Phe Thr Lys His Asp Ser Ser Asn Val Glu His				
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ccg ggt act ttc att gga gct gtg tcg aag ctt gac tat ttg aag gag				828
Pro Gly Thr Phe Ile Gly Ala Val Ser Lys Leu Asp Tyr Leu Lys Glu				
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ctt gga gtt aat tgt att gaa tta atg ccc tgc cat gag ttc aac gag				876
Leu Gly Val Asn Cys Ile Glu Leu Met Pro Cys His Glu Phe Asn Glu				
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Leu Glu Tyr Ser Thr Ser Ser Ser Lys Met Asn Phe Trp Gly Tyr Ser				
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acc ata aac ttc ttt tca cca atg aca aga tac aca tca ggc ggg ata				972
Thr Ile Asn Phe Phe Ser Pro Met Thr Arg Tyr Thr Ser Gly Gly Ile				
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aaa aac tgt ggg cgt gat gcc ata aat gag ttc aaa act ttt gta aga				1020
Lys Asn Cys Gly Arg Asp Ala Ile Asn Glu Phe Lys Thr Phe Val Arg				
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gag gct cac aaa cgg gga att gag gtg atc ctg gat gtt gtc ttc aac				1068
Glu Ala His Lys Arg Gly Ile Glu Val Ile Leu Asp Val Val Phe Asn				
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His Thr Ala Glu Gly Asn Glu Asn Gly Pro Ile Leu Ser Phe Lys Gly				
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gtc gat aat act aca tac tat atg ctt gca ccc aag gga gag ttt tat				1164
Val Asp Asn Thr Thr Tyr Tyr Met Leu Ala Pro Lys Gly Glu Phe Tyr				
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aac tat tct ggc tgt ggg aat acc ttc aac tgt aat cat cct gtg gtt				1212
Asn Tyr Ser Gly Cys Gly Asn Thr Phe Asn Cys Asn His Pro Val Val				
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cgt caa ttc att gta gat tgt tta aga tac tgg gtg acg gaa atg cat				1260
Arg Gln Phe Ile Val Asp Cys Leu Arg Tyr Trp Val Thr Glu Met His				
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gtt gat ggt ttt cgt ttt gat ctt gca tcc ata atg acc aga ggt tcc				1308
Val Asp Gly Phe Arg Phe Asp Leu Ala Ser Ile Met Thr Arg Gly Ser				
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Ser Leu Trp Asp Pro Val Asn Val Tyr Gly Ala Pro Ile Glu Gly Asp				
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atg atc aca aca ggg aca cct ctt gtt act cca cca ctt att gac atg				1404
Met Ile Thr Thr Gly Thr Pro Leu Val Thr Pro Pro Leu Ile Asp Met				
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Trp	Asp	Ala	Gly	Gly	Leu	Tyr	Gln	Val	Gly	Gln	Phe	Pro	His	Trp	Asn	
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gtt	tgg	tct	gag	tgg	aat	ggg	aag	tac	cgg	gac	att	gtg	cgt	caa	ttc	1548
Val	Trp	Ser	Glu	Trp	Asn	Gly	Lys	Tyr	Arg	Asp	Ile	Val	Arg	Gln	Phe	
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att	aaa	ggc	act	gat	gga	ttt	gct	ggc	ggc	ttt	gcc	gaa	tgt	ctt	tgt	1596
Ile	Lys	Gly	Thr	Asp	Gly	Phe	Ala	Gly	Gly	Phe	Ala	Glu	Cys	Leu	Cys	
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Gly	Ser	Pro	His	Leu	Tyr	Gln										
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aca	at	cat	ag	ta	g	cat	at	ggc	ta	aga	ag	ta	tag	gt	ata	1767
tata	tag	gtt	tt	aa	cac	cca	act	tg	cca	at	ga	ag	ga	ac	at	1827
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aga	aga	aa	act	at	att	gatt	tt	gcccc	cc	taa	aaga	ag	cc	at	ctc	1947
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caa	at	ttt	cta	ttt	gg	ttt	ct	ctaga	aat	ca	aacc	ag	ta	ac	tt	2127
tct	tatt	gat	ta	at	cag	gca	gga	gga	agg	aaa	cct	tgg	cac	agt	atc	2177
						Ala	Gly	Gly	Arg	Lys	Pro	Trp	His	Ser	Ile	
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Phe	Val	Cys	Ala	His	Asp	Gly	Phe	Thr	Leu	Ala	Asp	Leu	Val	Thr	Tyr	
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Asn	Lys	Lys	Tyr	Asn	Leu	Pro	Asn	Gly	Glu	Asn	Asn	Arg	Asp	Gly	Glu	
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Asn	His	Asn	Leu	Ser	Trp	Asn	Cys	Gly	Glu	Glu	Gly	Glu	Phe	Ala	Arg	
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Leu	Ser	Val	Lys	Arg	Leu	Arg	Lys	Arg	Gln	Met	Arg	Asn	Phe	Phe	Val	
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Cys Leu Met Val Ser Gln Gly Val Pro Met Phe Tyr Met Gly Asp Glu	
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Tyr Gly His Thr Lys Gly Gly Asn Asn Asn Thr Tyr Cys His Asp Ser	
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tat gtc aat tat ttt cgc tgg gat aaa aaa gaa caa tac tct gag ttg	2513
Tyr Val Asn Tyr Phe Arg Trp Asp Lys Lys Glu Gln Tyr Ser Glu Leu	
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cac cga ttc tgc tgc ctc atg acc aaa ttc cgc aag gag tgc gag ggt	2561
His Arg Phe Cys Cys Leu Met Thr Lys Phe Arg Lys Glu Cys Glu Gly	
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ctt ggc ctt gag gac ttt cca acg gcc aaa cgg ctg cag tgg cat ggt	2609
Leu Gly Leu Glu Asp Phe Pro Thr Ala Lys Arg Leu Gln Trp His Gly	
645 650 655 660	
cat cag cct ggg aag cct gat tgg tct gag aat agc cga ttc gtt gcc	2657
His Gln Pro Gly Lys Pro Asp Trp Ser Glu Asn Ser Arg Phe Val Ala	
665 670 675	
ttt tcc atg aaa gat gaa aga cag ggc gag atc tat gtg gcc ttc aac	2705
Phe Ser Met Lys Asp Glu Arg Gln Gly Glu Ile Tyr Val Ala Phe Asn	
680 685 690	
acc agc cac tta ccg gcc gtt gtt gag ctc cca gag cgc gca ggg cgc	2753
Thr Ser His Leu Pro Ala Val Val Glu Leu Pro Glu Arg Ala Gly Arg	
695 700 705	
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Arg Trp Glu Pro Val Val Asp Thr Gly Lys Pro Ala Pro Tyr Asp Phe	
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ctc acc gac gac tta cct gat cgc gct ctc acc ata cac cag ttc tcg	2849
Leu Thr Asp Asp Leu Pro Asp Arg Ala Leu Thr Ile His Gln Phe Ser	
725 730 735 740	
cat ttc ctc tac tcc aac ctc tac ccc atg ctc agc tac tca tcg gtc	2897
His Phe Leu Tyr Ser Asn Leu Tyr Pro Met Leu Ser Tyr Ser Ser Val	
745 750 755	
atc cta gta ttg cgc cct gat gtt tgagagacca atatatacag taaataatat	2951
Ile Leu Val Leu Arg Pro Asp Val	
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35 40 45

Tyr Ala Leu Gly Gly Ala Cys Arg Val Leu Ala Gly Met Pro Ala Pro
50 55 60

Leu Gly Ala Thr Ala Leu Ala Gly Gly Val Asn Phe Ala Val Tyr Ser
65 70 75 80

Gly Gly Ala Thr Ala Ala Ala Leu Cys Leu Phe Thr Pro Glu Asp Leu
85 90 95

Lys Ala Asp Arg Val Thr Glu Glu Val Pro Leu Asp Pro Leu Met Asn
100 105 110

Arg Thr Gly Asn Val Trp His Val Phe Ile Glu Gly Glu Leu His Asn
115 120 125

Met Leu Tyr Gly Tyr Arg Phe Asp Gly Thr Phe Ala Pro His Cys Gly
130 135 140

His Tyr Leu Asp Val Ser Asn Val Val Val Asp Pro Tyr Ala Lys Ala
145 150 155 160

Val Ile Ser Arg Gly Glu Tyr Gly Val Pro Ala Arg Gly Asn Asn Cys
165 170 175

Trp Pro Gln Met Ala Gly Met Ile Pro Leu Pro Tyr Ser Thr Phe Asp
180 185 190

Trp Glu Gly Asp Leu Pro Leu Arg Tyr Pro Gln Lys Asp Leu Val Ile
195 200 205

Tyr Glu Met His Leu Arg Gly Phe Thr Lys His Asp Ser Ser Asn Val
210 215 220

Glu His Pro Gly Thr Phe Ile Gly Ala Val Ser Lys Leu Asp Tyr Leu
225 230 235 240

Lys Glu Leu Gly Val Asn Cys Ile Glu Leu Met Pro Cys His Glu Phe
245 250 255

Asn Glu Leu Glu Tyr Ser Thr Ser Ser Ser Lys Met Asn Phe Trp Gly
260 265 270

Tyr Ser Thr Ile Asn Phe Phe Ser Pro Met Thr Arg Tyr Thr Ser Gly
275 280 285

Gly Ile Lys Asn Cys Gly Arg Asp Ala Ile Asn Glu Phe Lys Thr Phe
290 295 300

Val Arg Glu Ala His Lys Arg Gly Ile Glu Val Ile Leu Asp Val Val
305 310 315 320

Phe Asn His Thr Ala Glu Gly Asn Glu Asn Gly Pro Ile Leu Ser Phe
325 330 335

Lys Gly Val Asp Asn Thr Thr Tyr Tyr Met Leu Ala Pro Lys Gly Glu
340 345 350

Phe Tyr Asn Tyr Ser Gly Cys Gly Asn Thr Phe Asn Cys Asn His Pro
355 360 365

Val Val Arg Gln Phe Ile Val Asp Cys Leu Arg Tyr Trp Val Thr Glu
370 375 380

Met His Val Asp Gly Phe Arg Phe Asp Leu Ala Ser Ile Met Thr Arg
385 390 395 400

Gly Ser Ser Leu Trp Asp Pro Val Asn Val Tyr Gly Ala Pro Ile Glu
405 410 415

Gly Asp Met Ile Thr Thr Gly Thr Pro Leu Val Thr Pro Pro Leu Ile
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Asp Met Ile Ser Asn Asp Pro Ile Leu Gly Gly Val Lys Leu Ile Ala
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Glu Ala Trp Asp Ala Gly Gly Leu Tyr Gln Val Gly Gln Phe Pro His

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Trp Asn Val Trp Ser Glu Trp Asn Gly Lys Tyr Arg Asp Ile Val Arg				
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Gln Phe Ile Lys Gly Thr Asp Gly Phe Ala Gly Gly Phe Ala Glu Cys				
	485		490	495
Leu Cys Gly Ser Pro His Leu Tyr Gln Ala Gly Gly Arg Lys Pro Trp				
	500		505	510
His Ser Ile Asn Phe Val Cys Ala His Asp Gly Phe Thr Leu Ala Asp				
	515		520	525
Leu Val Thr Tyr Asn Lys Lys Tyr Asn Leu Pro Asn Gly Glu Asn Asn				
	530		535	540
Arg Asp Gly Glu Asn His Asn Leu Ser Trp Asn Cys Gly Glu Glu Gly				
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Glu Phe Ala Arg Leu Ser Val Lys Arg Leu Arg Lys Arg Gln Met Arg				
	565		570	575
Asn Phe Phe Val Cys Leu Met Val Ser Gln Gly Val Pro Met Phe Tyr				
	580		585	590
Met Gly Asp Glu Tyr Gly His Thr Lys Gly Gly Asn Asn Asn Thr Tyr				
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Cys His Asp Ser Tyr Val Asn Tyr Phe Arg Trp Asp Lys Lys Glu Gln				
	610		615	620
Tyr Ser Glu Leu His Arg Phe Cys Cys Leu Met Thr Lys Phe Arg Lys				
625		630		635 640
Glu Cys Glu Gly Leu Gly Leu Glu Asp Phe Pro Thr Ala Lys Arg Leu				
	645		650	655
Gln Trp His Gly His Gln Pro Gly Lys Pro Asp Trp Ser Glu Asn Ser				
	660		665	670
Arg Phe Val Ala Phe Ser Met Lys Asp Glu Arg Gln Gly Glu Ile Tyr				
	675		680	685

Val Ala Phe Asn Thr Ser His Leu Pro Ala Val Val Glu Leu Pro Glu
 690 695 700

Arg Ala Gly Arg Arg Trp Glu Pro Val Val Asp Thr Gly Lys Pro Ala
 705 710 715 720

Pro Tyr Asp Phe Leu Thr Asp Asp Leu Pro Asp Arg Ala Leu Thr Ile
 725 730 735

His Gln Phe Ser His Phe Leu Tyr Ser Asn Leu Tyr Pro Met Leu Ser
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Tyr Ser Ser Val Ile Leu Val Leu Arg Pro Asp Val
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 Thr Ala Gly Lys Gly Val Gly Glu Val Cys Ala Ala Val Val Glu Val
 15 20 25

gcg acg aag gcc gag gat gag ggg gag gag gac gag ccg gtg gcg gag 147
 Ala Thr Lys Ala Glu Asp Glu Gly Glu Glu Asp Glu Pro Val Ala Glu
 30 35 40

gac agg tac gcg ctc ggc ggc gcg tgc agg gtg ctc gcc gga atg ccc 195
 Asp Arg Tyr Ala Leu Gly Gly Ala Cys Arg Val Leu Ala Gly Met Pro
 45 50 55 60

acg ccg ctg ggc gcc acc gcg ctc gcc ggc ggg gtc aat ttc gcc gtc 243
 Thr Pro Leu Gly Ala Thr Ala Leu Ala Gly Gly Val Asn Phe Ala Val
 65 70 75

tac tcc ggc gga gcc aca gcc gcg gcg ctc tgc ctc ttc acg cca gaa 291
 Tyr Ser Gly Gly Ala Thr Ala Ala Ala Leu Cys Leu Phe Thr Pro Glu
 80 85 90

gat ctc aag gcg gat agg gtg acg gag gag gtt ccc ctt gac ccc ctg 339

Asp	Leu	Lys	Ala	Asp	Arg	Val	Thr	Glu	Glu	Val	Pro	Leu	Asp	Pro	Leu		
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atg	aat	cgg	act	ggg	aac	gta	tgg	cat	gtc	ttc	atc	gaa	ggc	gag	ctg		387
Met	Asn	Arg	Thr	Gly	Asn	Val	Trp	His	Val	Phe	Ile	Glu	Gly	Glu	Leu		
	110					115					120						
cag	gac	atg	ctt	tac	ggg	tac	agg	ttc	gac	ggc	acc	ttt	gct	cct	cac		435
Gln	Asp	Met	Leu	Tyr	Gly	Tyr	Arg	Phe	Asp	Gly	Thr	Phe	Ala	Pro	His		
	125				130					135					140		
tgc	ggg	cac	tac	ctt	gat	gtt	tcc	aat	gtc	gtg	gtg	gat	cct	tat	gct		483
Cys	Gly	His	Tyr	Leu	Asp	Val	Ser	Asn	Val	Val	Val	Asp	Pro	Tyr	Ala		
				145					150					155			
aag	gca	gtg	ata	agc	cga	ggg	gag	tat	ggc	gtt	ccg	gcg	cgt	ggc	aac		531
Lys	Ala	Val	Ile	Ser	Arg	Gly	Glu	Tyr	Gly	Val	Pro	Ala	Arg	Gly	Asn		
			160					165					170				
aat	tgc	tgg	cct	cag	atg	gct	ggc	atg	atc	cct	ctt	cca	tat	agc	acg		579
Asn	Cys	Trp	Pro	Gln	Met	Ala	Gly	Met	Ile	Pro	Leu	Pro	Tyr	Ser	Thr		
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Phe	Asp	Trp	Glu	Gly	Asp	Leu	Pro	Leu	Arg	Tyr	Pro	Gln	Lys	Asp	Leu		
	190					195					200						
gta	ata	tat	gag	atg	cac	ttg	cgt	gga	ttc	acg	aag	cat	gat	tca	agc		675
Val	Ile	Tyr	Glu	Met	His	Leu	Arg	Gly	Phe	Thr	Lys	His	Asp	Ser	Ser		
	205				210					215					220		
aat	gta	gaa	cat	ccc	ggc	act	ttc	att	ggg	gct	gtg	tcg	aag	ctt	gac		723
Asn	Val	Glu	His	Pro	Gly	Thr	Phe	Ile	Gly	Ala	Val	Ser	Lys	Leu	Asp		
				225					230					235			
tat	ttg	aag	gag	ctt	gga	gtt	aat	tgt	att	gag	tta	atg	ccc	tgc	cat		771
Tyr	Leu	Lys	Glu	Leu	Gly	Val	Asn	Cys	Ile	Glu	Leu	Met	Pro	Cys	His		
		240					245						250				
gag	ttc	aac	gag	ctg	gag	tac	tca	acc	tct	tct	tcc	aag	atg	aac	ttt		819
Glu	Phe	Asn	Glu	Leu	Glu	Tyr	Ser	Thr	Ser	Ser	Ser	Lys	Met	Asn	Phe		
		255					260					265					
tgg	gga	tat	tct	acc	ata	aac	ttc	ttt	tca	cca	atg	acg	aga	tac	aca		867
Trp	Gly	Tyr	Ser	Thr	Ile	Asn	Phe	Phe	Ser	Pro	Met	Thr	Arg	Tyr	Thr		
	270					275					280						
tca	ggc	ggg	ata	aaa	aac	tgt	ggg	cgt	gat	gcc	ata	aat	gag	ttc	aaa		915
Ser	Gly	Gly	Ile	Lys	Asn	Cys	Gly	Arg	Asp	Ala	Ile	Asn	Glu	Phe	Lys		
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Thr	Phe	Val	Arg	Glu	Ala	His	Lys	Arg	Gly	Ile	Glu	Val	Ile	Leu	Asp		
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Val	Val	Phe	Asn	His	Thr	Ala	Glu	Gly	Asn	Glu	Asn	Gly	Pro	Ile	Leu		

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Ser Phe Arg Gly Val Asp Asn Thr	Thr Tyr Tyr Met Leu Ala Pro Lys		
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gga gag ttt tat aac tat tct ggc tgt ggg aat acc ttc aac tgt aat	1107		
Gly Glu Phe Tyr Asn Tyr Ser Gly Cys Gly Asn Thr Phe Asn Cys Asn			
350	355 360		
cat cct gtg gtt cgt caa ttc att gta gat tgt tta aga tac tgg gtg	1155		
His Pro Val Val Arg Gln Phe Ile Val Asp Cys Leu Arg Tyr Trp Val			
365	370 375 380		
acg gaa atg cat gtt gat ggt ttt cgt ttt gat ctt gca tcc ata atg	1203		
Thr Glu Met His Val Asp Gly Phe Arg Phe Asp Leu Ala Ser Ile Met			
385	390 395		
acc aga ggt tcc agt ctg tgg gat cca gtt aac gtg tat gga gct cca	1251		
Thr Arg Gly Ser Ser Leu Trp Asp Pro Val Asn Val Tyr Gly Ala Pro			
400	405 410		
ata gaa ggt gac atg atc aca aca ggg aca cct ctt gtt act cca cca	1299		
Ile Glu Gly Asp Met Ile Thr Thr Gly Thr Pro Leu Val Thr Pro Pro			
415	420 425		
ctt att gac atg atc agc aat gac cca att ctt gga ggc gtc aag ctc	1347		
Leu Ile Asp Met Ile Ser Asn Asp Pro Ile Leu Gly Gly Val Lys Leu			
430	435 440		
gtt gct gaa gca tgg gat gca gga ggc ctc tat caa gta ggt caa ttc	1395		
Val Ala Glu Ala Trp Asp Ala Gly Gly Leu Tyr Gln Val Gly Gln Phe			
445	450 455 460		
cct cac tgg aat gtt tgg tct gag tgg aat ggg aag tac cgg gac att	1443		
Pro His Trp Asn Val Trp Ser Glu Trp Asn Gly Lys Tyr Arg Asp Ile			
465	470 475		
gtg cgt caa ttc att aaa ggc act gat gga ttt gct ggt ggt ttt gcc	1491		
Val Arg Gln Phe Ile Lys Gly Thr Asp Gly Phe Ala Gly Gly Phe Ala			
480	485 490		
gaa tgt ctt tgt gga agt cca cac cta tac cag gca gga gga agg aaa	1539		
Glu Cys Leu Cys Gly Ser Pro His Leu Tyr Gln Ala Gly Gly Arg Lys			
495	500 505		
cct tgg cac agt atc aac ttt gta tgt gca cac gat gga ttt aca ctg	1587		
Pro Trp His Ser Ile Asn Phe Val Cys Ala His Asp Gly Phe Thr Leu			
510	515 520		
gct gat ttg gta aca tat aat aac aag tac aat tta cca aat ggg gag	1635		
Ala Asp Leu Val Thr Tyr Asn Asn Lys Tyr Asn Leu Pro Asn Gly Glu			
525	530 535 540		
aac aac aga gat gga gaa aat cac aat ctt agc tgg aat tgt ggg gag	1683		
Asn Asn Arg Asp Gly Glu Asn His Asn Leu Ser Trp Asn Cys Gly Glu			
545	550 555		

gaa gga gaa ttc gca aga ttg tct gtc aaa aga ttg agg aag agg cag	1731
Glu Gly Glu Phe Ala Arg Leu Ser Val Lys Arg Leu Arg Lys Arg Gln	
560 565 570	
atg cgc aat ttc ttt gtt tgt ctc atg gtt tct caa gga gtt cca atg	1779
Met Arg Asn Phe Phe Val Cys Leu Met Val Ser Gln Gly Val Pro Met	
575 580 585	
ttc tac atg ggt gat gaa tat ggc cac aca aaa ggg ggc aac aac aat	1827
Phe Tyr Met Gly Asp Glu Tyr Gly His Thr Lys Gly Gly Asn Asn Asn	
590 595 600	
aca tac tgc cat gat tct tat gtc aat tat ttt cgc tgg gat aaa aaa	1875
Thr Tyr Cys His Asp Ser Tyr Val Asn Tyr Phe Arg Trp Asp Lys Lys	
605 610 615 620	
gaa caa tac tct gac ttg cac cga ttc tgt tgc ctc atg acc aaa ttc	1923
Glu Gln Tyr Ser Asp Leu His Arg Phe Cys Cys Leu Met Thr Lys Phe	
625 630 635	
cgc aag gag tgc gag ggt ctt ggc ctt gag gat ttt cca acg gcc gaa	1971
Arg Lys Glu Cys Glu Gly Leu Gly Leu Glu Asp Phe Pro Thr Ala Glu	
640 645 650	
cgg ctg cag tgg cat ggt cat cag cct ggg aag cct gat tgg tct gag	2019
Arg Leu Gln Trp His Gly His Gln Pro Gly Lys Pro Asp Trp Ser Glu	
655 660 665	
aat agc cga ttc gtt gcc ttt tcc atg aaa gat gaa aga cag ggc gag	2067
Asn Ser Arg Phe Val Ala Phe Ser Met Lys Asp Glu Arg Gln Gly Glu	
670 675 680	
atc tat gtg gcc ttc aac acc agc cac tta ccg gcc gtt gtt gag ctc	2115
Ile Tyr Val Ala Phe Asn Thr Ser His Leu Pro Ala Val Val Glu Leu	
685 690 695 700	
ccg gag cgc aca ggg cgc cgg tgg gaa ccg gtg gtg gac aca ggc aag	2163
Pro Glu Arg Thr Gly Arg Arg Trp Glu Pro Val Val Asp Thr Gly Lys	
705 710 715	
cca gca cca tac gac ttc ctc act gac gac tta cct gat cgc gct ctc	2211
Pro Ala Pro Tyr Asp Phe Leu Thr Asp Asp Leu Pro Asp Arg Ala Leu	
720 725 730	
acc ata cac cag ttc tct cat ttc ctc aac tcc aac ctc tac ccc atg	2259
Thr Ile His Gln Phe Ser His Phe Leu Asn Ser Asn Leu Tyr Pro Met	
735 740 745	
ctc agc tac tca tcg gtc atc cta gta ttg cgc cct gat gtt tga	2304
Leu Ser Tyr Ser Ser Val Ile Leu Val Leu Arg Pro Asp Val	
750 755 760	
gaggcggata tacagtaaataaatatgtata tatgtagtcc tttggcgtat tatcagtgtg	2364
cacaattgct ctattgccaa tgatctattc gatccacaga tacatgtgca aaaaaaaaaa	2424

aaaaaaactc gag

2437

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<212> PRT
<213> Triticum aestivum L. cv. Florida

<400> 4

Pro Ala Pro Arg Leu Arg Arg Trp Arg Pro Asn Ala Thr Ala Gly Lys
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Gly Val Gly Glu Val Cys Ala Ala Val Val Glu Val Ala Thr Lys Ala
20 25 30

Glu Asp Glu Gly Glu Glu Asp Glu Pro Val Ala Glu Asp Arg Tyr Ala
35 40 45

Leu Gly Gly Ala Cys Arg Val Leu Ala Gly Met Pro Thr Pro Leu Gly
50 55 60

Ala Thr Ala Leu Ala Gly Gly Val Asn Phe Ala Val Tyr Ser Gly Gly
65 70 75 80

Ala Thr Ala Ala Ala Leu Cys Leu Phe Thr Pro Glu Asp Leu Lys Ala
85 90 95

Asp Arg Val Thr Glu Glu Val Pro Leu Asp Pro Leu Met Asn Arg Thr
100 105 110

Gly Asn Val Trp His Val Phe Ile Glu Gly Glu Leu Gln Asp Met Leu
115 120 125

Tyr Gly Tyr Arg Phe Asp Gly Thr Phe Ala Pro His Cys Gly His Tyr
130 135 140

Leu Asp Val Ser Asn Val Val Val Asp Pro Tyr Ala Lys Ala Val Ile
145 150 155 160

Ser Arg Gly Glu Tyr Gly Val Pro Ala Arg Gly Asn Asn Cys Trp Pro
165 170 175

Gln Met Ala Gly Met Ile Pro Leu Pro Tyr Ser Thr Phe Asp Trp Glu
180 185 190

Gly Asp Leu Pro Leu Arg Tyr Pro Gln Lys Asp Leu Val Ile Tyr Glu
195 200 205

Met His Leu Arg Gly Phe Thr Lys His Asp Ser Ser Asn Val Glu His
210 215 220

Pro Gly Thr Phe Ile Gly Ala Val Ser Lys Leu Asp Tyr Leu Lys Glu
225 230 235 240

Leu Gly Val Asn Cys Ile Glu Leu Met Pro Cys His Glu Phe Asn Glu
245 250 255

Leu Glu Tyr Ser Thr Ser Ser Ser Lys Met Asn Phe Trp Gly Tyr Ser
260 265 270

Thr Ile Asn Phe Phe Ser Pro Met Thr Arg Tyr Thr Ser Gly Gly Ile
275 280 285

Lys Asn Cys Gly Arg Asp Ala Ile Asn Glu Phe Lys Thr Phe Val Arg
290 295 300

Glu Ala His Lys Arg Gly Ile Glu Val Ile Leu Asp Val Val Phe Asn
305 310 315 320

His Thr Ala Glu Gly Asn Glu Asn Gly Pro Ile Leu Ser Phe Arg Gly
325 330 335

Val Asp Asn Thr Thr Tyr Tyr Met Leu Ala Pro Lys Gly Glu Phe Tyr
340 345 350

Asn Tyr Ser Gly Cys Gly Asn Thr Phe Asn Cys Asn His Pro Val Val
355 360 365

Arg Gln Phe Ile Val Asp Cys Leu Arg Tyr Trp Val Thr Glu Met His
370 375 380

Val Asp Gly Phe Arg Phe Asp Leu Ala Ser Ile Met Thr Arg Gly Ser
385 390 395 400

Ser Leu Trp Asp Pro Val Asn Val Tyr Gly Ala Pro Ile Glu Gly Asp
405 410 415

Met Ile Thr Thr Gly Thr Pro Leu Val Thr Pro Pro Leu Ile Asp Met
420 425 430

Ile Ser Asn Asp Pro Ile Leu Gly Gly Val Lys Leu Val Ala Glu Ala
435 440 445

Trp Asp Ala Gly Gly Leu Tyr Gln Val Gly Gln Phe Pro His Trp Asn
450 455 460

Val Trp Ser Glu Trp Asn Gly Lys Tyr Arg Asp Ile Val Arg Gln Phe
465 470 475 480

Ile Lys Gly Thr Asp Gly Phe Ala Gly Gly Phe Ala Glu Cys Leu Cys
485 490 495

Gly Ser Pro His Leu Tyr Gln Ala Gly Gly Arg Lys Pro Trp His Ser
500 505 510

Ile Asn Phe Val Cys Ala His Asp Gly Phe Thr Leu Ala Asp Leu Val
515 520 525

Thr Tyr Asn Asn Lys Tyr Asn Leu Pro Asn Gly Glu Asn Asn Arg Asp
530 535 540

Gly Glu Asn His Asn Leu Ser Trp Asn Cys Gly Glu Glu Gly Glu Phe
545 550 555 560

Ala Arg Leu Ser Val Lys Arg Leu Arg Lys Arg Gln Met Arg Asn Phe
565 570 575

Phe Val Cys Leu Met Val Ser Gln Gly Val Pro Met Phe Tyr Met Gly
580 585 590

Asp Glu Tyr Gly His Thr Lys Gly Gly Asn Asn Asn Thr Tyr Cys His
595 600 605

Asp Ser Tyr Val Asn Tyr Phe Arg Trp Asp Lys Lys Glu Gln Tyr Ser
610 615 620

Asp Leu His Arg Phe Cys Cys Leu Met Thr Lys Phe Arg Lys Glu Cys
625 630 635 640

Glu Gly Leu Gly Leu Glu Asp Phe Pro Thr Ala Glu Arg Leu Gln Trp

645

650

655

His Gly His Gln Pro Gly Lys Pro Asp Trp Ser Glu Asn Ser Arg Phe
 660 665 670

Val Ala Phe Ser Met Lys Asp Glu Arg Gln Gly Glu Ile Tyr Val Ala
 675 680 685

Phe Asn Thr Ser His Leu Pro Ala Val Val Glu Leu Pro Glu Arg Thr
 690 695 700

Gly Arg Arg Trp Glu Pro Val Val Asp Thr Gly Lys Pro Ala Pro Tyr
 705 710 715 720

Asp Phe Leu Thr Asp Asp Leu Pro Asp Arg Ala Leu Thr Ile His Gln
 725 730 735

Phe Ser His Phe Leu Asn Ser Asn Leu Tyr Pro Met Leu Ser Tyr Ser
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Ser Val Ile Leu Val Leu Arg Pro Asp Val
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24

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<223> primer

<400> 10

gctcgagtcg actcaaacat cagggcgcaa tac

33